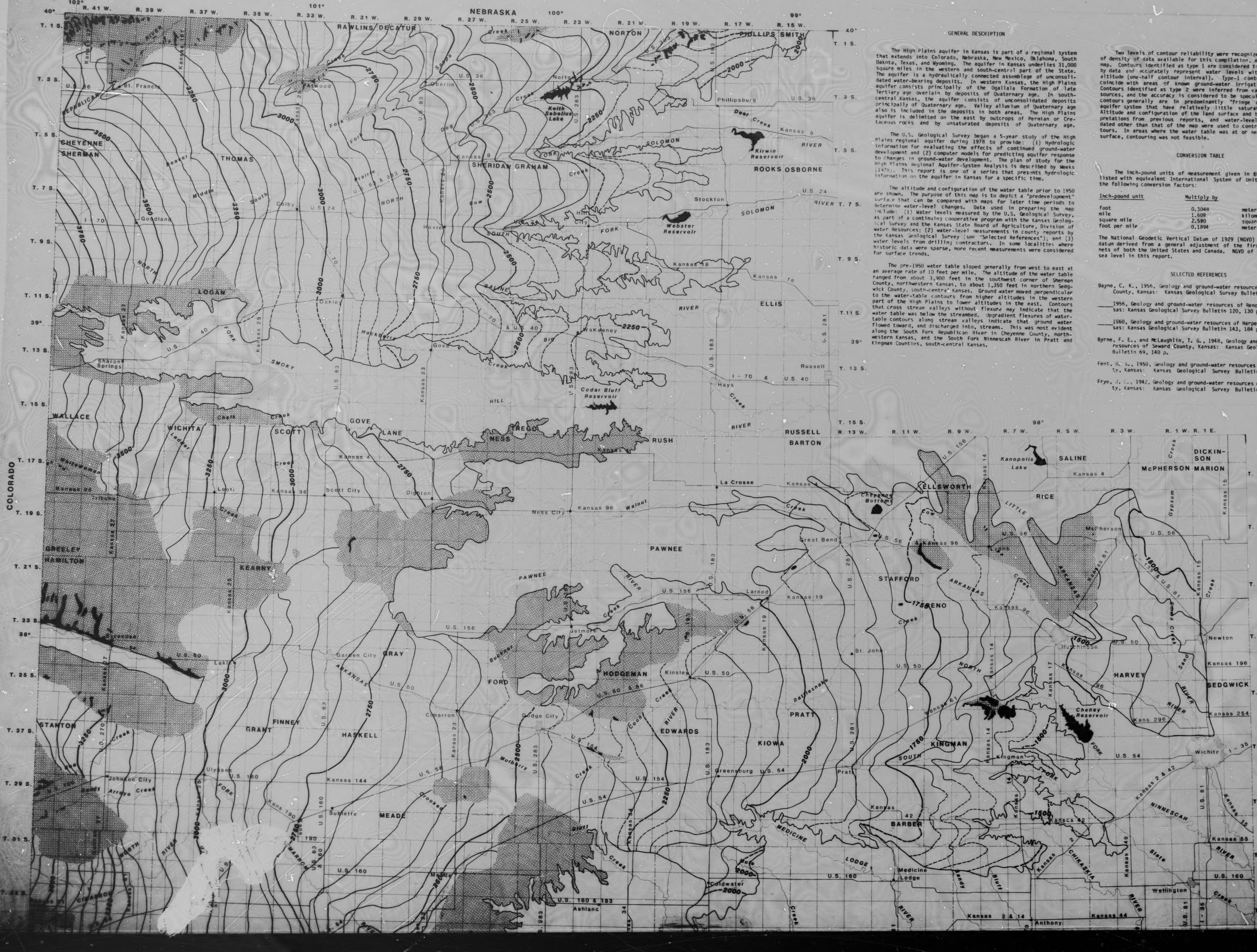
DEPARTMENT OF THE INTERIOR
UNITED STATES GEOLOGICAL SURVEY



GENERAL DESCRIPTION

The High Plains aquifer in Kansas is part of a regional system that extends into Colorado, Nebraska, New Mexico, Oklahoma, South Dakota, Texas, and Wyoming. The aquifer in Kansas underlies 31,000 square miles in the western and south-central part of the State. The aquifer is a hydraulically connected assemblage of unconsolidated water-bearing deposits. In western Kansas, the High Plains aquifer consists principally of the Ogallala Formation of late Tertiary age overlain by deposits of Quaternary age. In south-central Kansas, the aquifer consists of unconsolidated deposits principally of Quaternary age. Valley alluvium of Quaternary age also is included in the deposits in both areas. The High Plains aquifer is delimited on the east by outcrops of Permian or Cretaceous rocks and by unsaturated deposits of Quaternary age.

The U.S. Geological Survey began a 5-year study of the High Plains regional aquifer during 1978 to provide: (1) Hydrologic information for evaluating the effects of continued ground-water development and (2) computer models for predicting aquifer response to changes in ground-water development. The plan of study for the High Plains Regional Aquifer-System Analysis is described by Weeks (1978). This report is one of a series that presents hydrologic information on the aquifer in Kansas for a specific time.

The altitude and configuration of the water table prior to 1950 are shown. The purpose of this map is to depict a "predevelopment" surface that can be compared with maps for later time periods to determine water-level changes. Data used in preparing the map include: (1) Water levels measured by the U.S. Geological Survey, as part of a continuing cooperative program with the Kansas Geological Survey and the Kansas State Board of Agriculture, Division of Water Resources; (2) water-level measurements in county reports by the Kansas Geological Survey (see "Selected References"); and (3) water levels from drilling contractors. In some localities where historic data were sparse, more recent measurements were considered for surface trends.

The pre-1950 water table sloped generally from west to east at an average rate of 10 feet per mile. The altitude of the water table ranged from about 3,900 feet in the southwest corner of Sherman County, northwestern Kansas, to about 1,350 feet in northern Sedgwick County, south-central Kansas. Ground water moved perpendicular to the water-table contours from higher altitudes in the western part of the High Plains to lower altitudes in the east. Contours that cross stream valleys without flexure may indicate that the water table was below the streambed. Upgradient flexures of water-table contours along stream valleys indicate that ground water flowed toward, and discharged into, streams. This was most evident along the South Fork Republican River in Cheyenne County, northwestern Kansas, and the South Fork Ninnescah River in Pratt and Kingman Counties, south-central Kansas.

Two levels of contour reliability were recognized on the basis of density of data available for this compilation, as shown on the map. Contours identified as type 1 are considered to be controlled by data and accurately represent water levels within ± 25 feet altitude (one-half contour interval). Type-1 contours generally coincide with areas of known ground-water irrigation potential. Contours identified as type 2 were inferred from various indirect sources, and the accuracy is considered to be speculative. Type-2 contours generally are in predominantly "fringe areas" of the aquifer system that have relatively little saturated thickness. Altitude and configuration of the land surface and bedrock, interpretations from previous reports, and water-level measurements dated other than that of the map were used to control type-2 contours. In areas where the water table was at or near the bedrock surface, contouring was not feasible.

CONVERSION TABLE

The inch-pound units of measurement given in this report are listed with equivalent International System of Units (SI), using the following conversion factors:

Inch-pound unit	Multiply by	SI unit
foot	0.3048	meter
mile	1.609	kilometer
square mile	2.590	square kilometer
foot per mile	0.1894	meter per kilometer

The National Geodetic Vertical Datum of 1929 (NGVD) is a geodetic datum derived from a general adjustment of the first-order level nets of both the United States and Canada. NGVD of 1929 refers to sea level in this report.

SELECTED REFERENCES

Bayne, C. K., 1956, Geology and ground-water resources of Sheridan County, Kansas: Kansas Geological Survey Bulletin 116, 94 p.

_____1956, Geology and ground-water resources of Reno County, Kansas: Kansas Geological Survey Bulletin 120, 130 p.

_____1960, Geology and ground-water resources of Harper County, Kansas: Kansas Geological Survey Bulletin 143, 184 p.

Byrne, F. E., and McLaughlin, T. G., 1948, Geology and ground-water resources of Seward County, Kansas: Kansas Geological Survey Bulletin 69, 140 p.

Fent, O. S., 1950, Geology and ground-water resources of Rice County, Kansas: Kansas Geological Survey Bulletin 85, 142 p.

Frye, J. C., 1942, Geology and ground-water resources of Meade County, Kansas: Kansas Geological Survey Bulletin 45, 152 p.

_____1945, Geology and
Kansas: Kansas Geo

Frye, J. C., and Leonar
resources of Norton
Kansas: Kansas Geo

Hodson, W. G., 1963, Geo
County, Kansas: Ka

_____1965, Geology and gr
sas: Kansas Geologic

_____1969, Geology and
Kansas: Kansas Geo

Hodson, W. G., and Kahl,
sources of Gove Co
Bulletin 145, 126 p.

Johnson, C. R., 1958, G
County, Kansas: Ka

Lane, C. W., 1960, Geol
County, Kansas: Kan

Latta, B. F., 1941, Geol
County, Kansas: Ka

_____1944, Geology and g
Counties, Kansas: K

_____1948, Geology and gr
sas: Kansas Geologi

_____1950, Geology and gr
Counties, Kansas: K

Layton, D. W., and Berry,
sources of Pratt Cou
ical Survey Bulletin

McLaughlin, T. G., 1942,
ton County, Kansas:
126 p.

_____1943, Geology and gro
Counties, Kansas: Ka

_____1946, Geology and g
and Stevens Counties
tin 61, 221 p.

_____1949, Geology and gr
Counties, Kansas: Ka

Pabst, M. E., and Stullken
of the water table in
U.S. Geological Surv
File Report 81-1004,

Prescott, G. C., Jr., 195
Lane County, Kansas:
126 p.

_____1953, Geology and gr
Kansas: Kansas Geolo

_____1953, Geology and gr
Kansas: Kansas Geolo

_____1955, Geology and g
Kansas: Kansas Geolo

Prescott, G. C., Jr., Bran
logy and ground-water
ties, Kansas: Kansas

Stullken, L. E., and Pabst
of the water table in
U.S. Geological Surv
File Report 81-144,

Waite, H. A., 1942, Geolog
ty, Kansas: Kansas

_____1947, Geology and gro
Kansas Geological Sur

Walters, K. L., 1956, Geol
County, Kansas: Kans

Watts, K. R., and Stullken
of the base of the H
logical Survey Water-
81-344, scale 1:500,0

Weeks, J. B., 1978, Plan o
fer-System Analysis
New Mexico, Oklahoma,
Geological Survey Wat

Williams, C. C., and Lohma
resources of a part o
ference to the Wichita
ical Survey Bulletin

EXPLANA

■ AREA OF BEDROCK OUTCROP

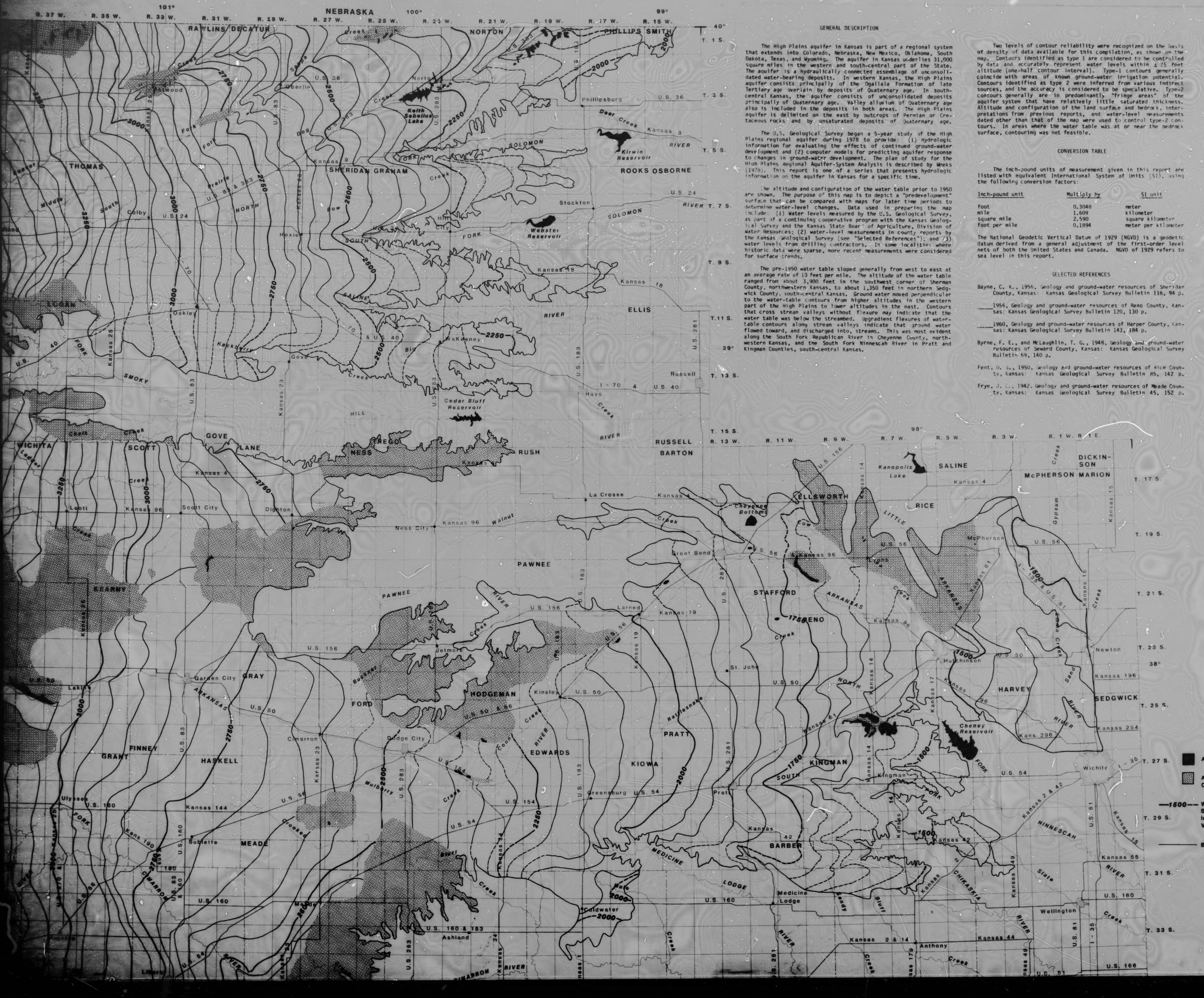
▨ AREA WHERE WATER TABLE I
Contours not shown

—1500— — WATER-TABLE CONTOUR— Sh
Solid where accurately located
is speculative (type 2). Conto
Vertical Datum of 1929

——— BOUNDARY OF HIGH PLAINS A

E INTERIOR
OLOGICAL SURVEY

OPEN-FILE REPORT 82-117



GENERAL DESCRIPTION

The High Plains aquifer in Kansas is part of a regional system that extends into Colorado, Nebraska, New Mexico, Oklahoma, South Dakota, Texas, and Wyoming. The aquifer in Kansas underlies 31,000 square miles in the western and south-central part of the State. The aquifer is a hydraulically connected assemblage of unconsolidated water-bearing deposits. In western Kansas, the High Plains aquifer consists principally of the Ogallala Formation of late Tertiary age overlain by deposits of Quaternary age. In south-central Kansas, the aquifer consists of unconsolidated deposits principally of Quaternary age. Valley alluvium of Quaternary age also is included in the deposits in both areas. The High Plains aquifer is delimited on the east by outcrops of Permian or Cretaceous rocks and by unsaturated deposits of Quaternary age.

The U.S. Geological Survey began a 5-year study of the High Plains regional aquifer during 1978 to provide: (1) Hydrologic information for evaluating the effects of continued ground-water development and (2) computer models for predicting aquifer response to changes in ground-water development. The plan of study for the High Plains Regional Aquifer-System Analysis is described by Weeks (1978). This report is one of a series that presents hydrologic information on the aquifer in Kansas for a specific time.

The altitude and configuration of the water table prior to 1950 are shown. The purpose of this map is to depict a "predevelopment" surface that can be compared with maps for later time periods to determine water-level changes. Data used in preparing the map include: (1) Water levels measured by the U.S. Geological Survey, as part of a continuing cooperative program with the Kansas Geological Survey and the Kansas State Board of Agriculture, Division of Water Resources; (2) water-level measurements in county reports by the Kansas Geological Survey (see "Selected References"); and (3) water levels from drilling contractors. In some localities where historic data were sparse, more recent measurements were considered for surface trends.

The pre-1950 water table sloped generally from west to east at an average rate of 10 feet per mile. The altitude of the water table ranged from about 3,900 feet in the southwest corner of Sherman County, northwestern Kansas, to about 1,350 feet in northern Sedgwick County, south-central Kansas. Ground water moved perpendicular to the water-table contours from higher altitudes in the western part of the High Plains to lower altitudes in the east. Contours that cross stream valleys without flexure may indicate that the water table was below the streambed. Upgradient flexures of water-table contours along stream valleys indicate that ground water flowed toward, and discharged into, streams. This was most evident along the South Fork Republican River in Cheyenne County, northwestern Kansas, and the South Fork Ninnescah River in Pratt and Kingman Counties, south-central Kansas.

Two levels of contour reliability were recognized on the basis of density of data available for this compilation, as shown on the map. Contours identified as type 1 are considered to be controlled by data and accurately represent water levels within ± 25 feet altitude (one-half contour interval). Type-1 contours generally coincide with areas of known ground-water irrigation potential. Contours identified as type 2 were inferred from various indirect sources, and the accuracy is considered to be speculative. Type-2 contours generally are in predominantly "fringe areas" of the aquifer system that have relatively little saturated thickness. Altitude and configuration of the land surface and bedrock, interpretations from previous reports, and water-level measurements dated other than that of the map were used to control type-2 contours. In areas where the water table was at or near the bedrock surface, contouring was not feasible.

CONVERSION TABLE

The inch-pound units of measurement given in this report are listed with equivalent International System of Units (SI), using the following conversion factors:

Inch-pound unit	Multiply by	SI unit
foot	0.3048	meter
mile	1.609	kilometer
square mile	2.590	square kilometer
foot per mile	0.1894	meter per kilometer

The National Geodetic Vertical Datum of 1929 (NGVD) is a geodetic datum derived from a general adjustment of the first-order level nets of both the United States and Canada. NGVD of 1929 refers to sea level in this report.

SELECTED REFERENCES

Bayne, C. K., 1956, Geology and ground-water resources of Sheridan County, Kansas: Kansas Geological Survey Bulletin 116, 94 p.

_____1956, Geology and ground-water resources of Reno County, Kansas: Kansas Geological Survey Bulletin 120, 130 p.

_____1960, Geology and ground-water resources of Harper County, Kansas: Kansas Geological Survey Bulletin 143, 184 p.

Byrne, F. E., and McLaughlin, T. G., 1948, Geology and ground-water resources of Seward County, Kansas: Kansas Geological Survey Bulletin 69, 140 p.

Fent, O. S., 1950, Geology and ground-water resources of Rice County, Kansas: Kansas Geological Survey Bulletin 85, 142 p.

Frye, J. C., 1942, Geology and ground-water resources of Meade County, Kansas: Kansas Geological Survey Bulletin 45, 152 p.

_____1945, Geology and ground-water resources of Thomas County, Kansas: Kansas Geological Survey Bulletin 59, 110 p.

Frye, J. C., and Leonard, A. R., 1949, Geology and ground-water resources of Norton County and northwestern Phillips County, Kansas: Kansas Geological Survey Bulletin 81, 144 p.

Hodson, W. G., 1963, Geology and ground-water resources of Wallace County, Kansas: Kansas Geological Survey Bulletin 161, 108 p.

_____1965, Geology and ground-water resources of Trego County, Kansas: Kansas Geological Survey Bulletin 174, 80 p.

_____1969, Geology and ground-water resources of Decatur County, Kansas: Kansas Geological Survey Bulletin 196, 41 p.

Hodson, W. G., and Wahl, K. D., 1960, Geology and ground-water resources of Gove County, Kansas: Kansas Geological Survey Bulletin 145, 126 p.

Johnson, C. R., 1958, Geology and ground-water resources of Logan County, Kansas: Kansas Geological Survey Bulletin 129, 175 p.

Lane, C. W., 1960, Geology and ground-water resources of Kingman County, Kansas: Kansas Geological Survey Bulletin 144, 174 p.

Latta, B. F., 1941, Geology and ground-water resources of Stanton County, Kansas: Kansas Geological Survey Bulletin 37, 119 p.

_____1944, Geology and ground-water resources of Finney and Gray Counties, Kansas: Kansas Geological Survey Bulletin 55, 272 p.

_____1948, Geology and ground-water resources of Kiowa County, Kansas: Kansas Geological Survey Bulletin 65, 151 p.

_____1950, Geology and ground-water resources of Barton and Stafford Counties, Kansas: Kansas Geological Survey Bulletin 88, 228 p.

Layton, D. W., and Berry, D. W., 1973, Geology and ground-water resources of Pratt County, south-central Kansas: Kansas Geological Survey Bulletin 205, 33 p.

McLaughlin, T. G., 1942, Geology and ground-water resources of Morton County, Kansas: Kansas Geological Survey Bulletin 40, 126 p.

_____1943, Geology and ground-water resources of Hamilton and Kearny Counties, Kansas: Kansas Geological Survey Bulletin 49, 220 p.

_____1946, Geology and ground-water resources of Grant, Haskell, and Stevens Counties, Kansas: Kansas Geological Survey Bulletin 61, 221 p.

_____1949, Geology and ground-water resources of Pawnee and Edwards Counties, Kansas: Kansas Geological Survey Bulletin 80, 189 p.

Pabst, M. E., and Stullken, L. E., 1981, Altitude and configuration of the water table in the High Plains aquifer in Kansas, 1980: U.S. Geological Survey Water-Resources Investigations Open-File Report 81-1004, scale 1:500,000, 1 sheet.

Prescott, G. C., Jr., 1951, Geology and ground-water resources of Lane County, Kansas: Kansas Geological Survey Bulletin 93, 126 p.

_____1953, Geology and ground-water resources of Cheyenne County, Kansas: Kansas Geological Survey Bulletin 100, 106 p.

_____1953, Geology and ground-water resources of Sherman County, Kansas: Kansas Geological Survey Bulletin 105, 130 p.

_____1955, Geology and ground-water resources of Graham County, Kansas: Kansas Geological Survey Bulletin 110, 98 p.

Prescott, G. C., Jr., Branch, J. R., and Wilson, W. W., 1954, Geology and ground-water resources of Wichita and Greeley Counties, Kansas: Kansas Geological Survey Bulletin 108, 134 p.

Stullken, L. E., and Pabst, M. E., 1981, Altitude and configuration of the water table in the High Plains aquifer in Kansas, 1975: U.S. Geological Survey Water-Resources Investigations Open-File Report 81-144, scale 1:500,000, 1 sheet.

Waite, H. A., 1942, Geology and ground-water resources of Ford County, Kansas: Kansas Geological Survey Bulletin 43, 250 p.

_____1947, Geology and ground-water resources of Scott City, Kansas: Kansas Geological Survey Bulletin 66, 216 p.

Walters, K. L., 1956, Geology and ground-water resources of Rawlins County, Kansas: Kansas Geological Survey Bulletin 117, 100 p.

Watts, K. R., and Stullken, L. E., 1981, Generalized configuration of the base of the High Plains aquifer in Kansas: U.S. Geological Survey Water-Resources Investigations Open-File Report 81-344, scale 1:500,000, 1 sheet.

Weeks, J. B., 1978, Plan of study for the High Plains Regional Aquifer-System Analysis in parts of Colorado, Kansas, Nebraska, New Mexico, Oklahoma, South Dakota, Texas, and Wyoming: U.S. Geological Survey Water-Resources Investigations 78-70, 28 p.

Williams, C. C., and Lohman, S. W., 1949, Geology and ground-water resources of a part of south-central Kansas, with special reference to the Wichita municipal water supply: Kansas Geological Survey Bulletin 79, 455 p.

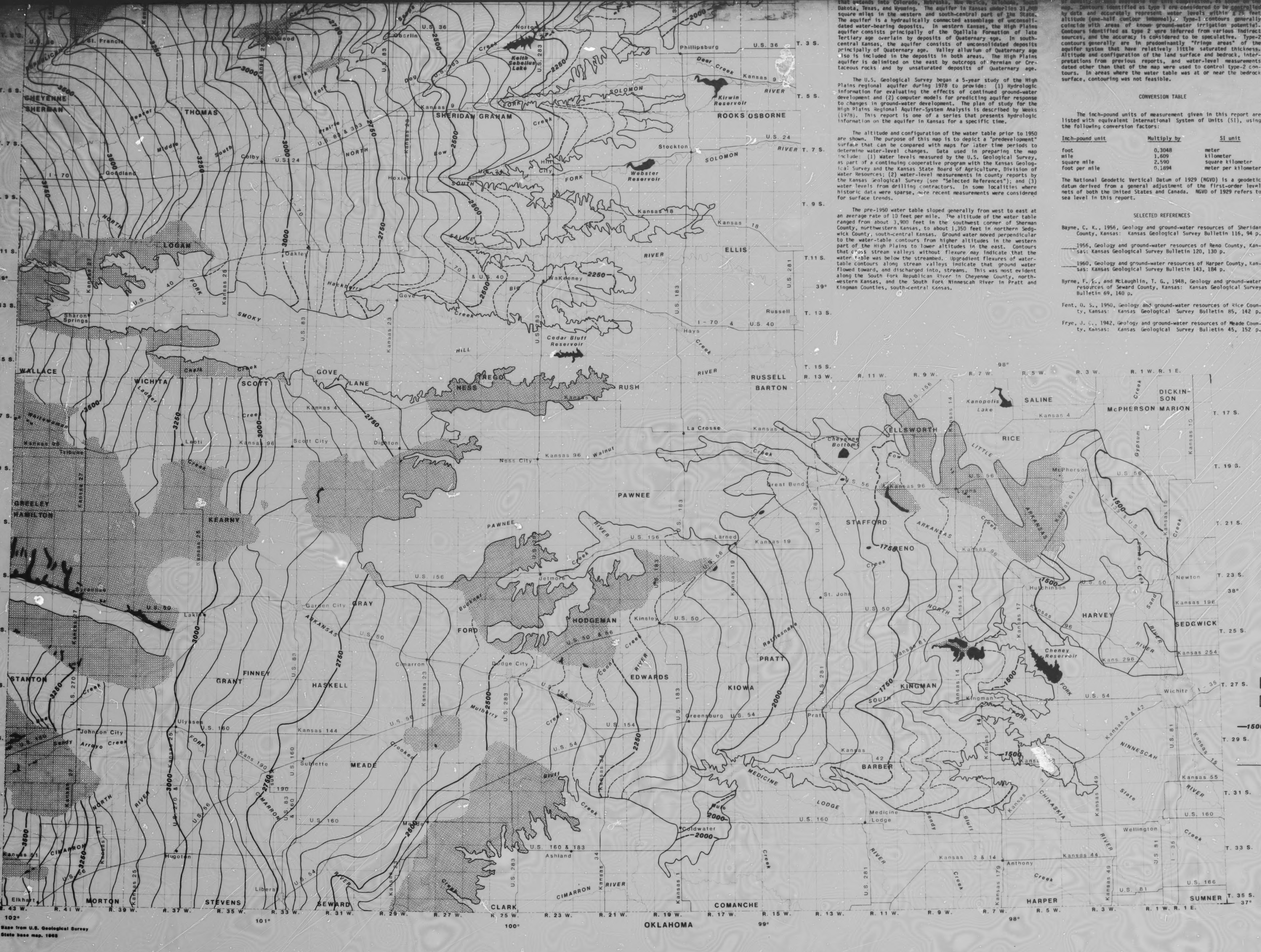
EXPLANATION

■ **AREA OF BEDROCK OUTCROP WITHIN AQUIFER BOUNDARY**

▨ **AREA WHERE WATER TABLE IS AT OR NEAR BEDROCK SURFACE-- Contours not shown**

—1500— **WATER-TABLE CONTOUR-- Shows altitude of water table, pre 1950. Solid where accurately located (type 1): and short dash where location is speculative (type 2). Contour interval 50 feet. National Geodetic Vertical Datum of 1929**

—— **BOUNDARY OF HIGH PLAINS AQUIFER**



Base from U.S. Geological Survey
State base map, 1965

that extends into Colorado, Nebraska, New Mexico, Oklahoma, South Dakota, Texas, and Wyoming. The aquifer in Kansas underlies 31,000 square miles in the western and south-central part of the State. The aquifer is a hydraulically connected assemblage of unconsolidated water-bearing deposits. In western Kansas, the High Plains aquifer consists principally of the Ogallala Formation of late Tertiary age overlain by deposits of Quaternary age. In south-central Kansas, the aquifer consists of unconsolidated deposits principally of Quaternary age. Valley alluvium of Quaternary age also is included in the deposits in both areas. The High Plains aquifer is delimited on the east by outcrops of Permian or Cretaceous rocks and by unsaturated deposits of Quaternary age.

The U.S. Geological Survey began a 5-year study of the High Plains regional aquifer during 1978 to provide: (1) Hydrologic information for evaluating the effects of continued ground-water development and (2) computer models for predicting aquifer response to changes in ground-water development. The plan of study for the High Plains Regional Aquifer-System Analysis is described by Weeks (1978). This report is one of a series that presents hydrologic information on the aquifer in Kansas for a specific time.

The altitude and configuration of the water table prior to 1950 are shown. The purpose of this map is to depict a "predevelopment" surface that can be compared with maps for later time periods to determine water-level changes. Data used in preparing the map include: (1) Water levels measured by the U.S. Geological Survey, as part of a continuing cooperative program with the Kansas Geological Survey and the Kansas State Board of Agriculture, Division of Water Resources; (2) water-level measurements in county reports by the Kansas Geological Survey (see "Selected References"); and (3) water levels from drilling contractors. In some localities where historic data were sparse, more recent measurements were considered for surface trends.

The pre-1950 water table sloped generally from west to east at an average rate of 10 feet per mile. The altitude of the water table ranged from about 3,900 feet in the southwest corner of Sherman County, northwestern Kansas, to about 1,350 feet in northern Sedgwick County, south-central Kansas. Ground water moved perpendicular to the water-table contours from higher altitudes in the western part of the High Plains to lower altitudes in the east. Contours that cross stream valleys without flexure may indicate that the water table was below the streambed. Upgradient flexures of water-table contours along stream valleys indicate that ground water flowed toward, and discharged into, streams. This was most evident along the South Fork Republican River in Cheyenne County, northwestern Kansas, and the South Fork Ninnescah River in Pratt and Kingman Counties, south-central Kansas.

of density of data available for this compilation, as shown on the map. Contours identified as type 1 are considered to be controlled by data and accurately represent water levels within ± 25 feet altitude (one-half contour interval). Type-1 contours generally coincide with areas of known ground-water irrigation potential. Contours identified as type 2 were inferred from various indirect sources, and the accuracy is considered to be speculative. Type-2 contours generally are in predominantly "fringe areas" of the aquifer system that have relatively little saturated thickness. Altitude and configuration of the land surface and bedrock, interpretations from previous reports, and water-level measurements dated other than that of the map were used to control type-2 contours. In areas where the water table was at or near the bedrock surface, contouring was not feasible.

CONVERSION TABLE

The inch-pound units of measurement given in this report are listed with equivalent International System of Units (SI), using the following conversion factors:

Inch-pound unit	Multiply by	SI unit
foot	0.3048	meter
mile	1.609	kilometer
square mile	2.590	square kilometer
foot per mile	0.1894	meter per kilometer

The National Geodetic Vertical Datum of 1929 (NGVD) is a geodetic datum derived from a general adjustment of the first-order level nets of both the United States and Canada. NGVD of 1929 refers to sea level in this report.

SELECTED REFERENCES

Bayne, C. K., 1956, Geology and ground-water resources of Sheridan County, Kansas: Kansas Geological Survey Bulletin 116, 94 p.

_____1956, Geology and ground-water resources of Reno County, Kansas: Kansas Geological Survey Bulletin 120, 130 p.

_____1960, Geology and ground-water resources of Harper County, Kansas: Kansas Geological Survey Bulletin 143, 184 p.

Byrne, F. E., and McLaughlin, T. G., 1948, Geology and ground-water resources of Seward County, Kansas: Kansas Geological Survey Bulletin 69, 140 p.

Fent, O. S., 1950, Geology and ground-water resources of Rice County, Kansas: Kansas Geological Survey Bulletin 85, 142 p.

Frye, J. C., 1942, Geology and ground-water resources of Meade County, Kansas: Kansas Geological Survey Bulletin 45, 152 p.

Frye, J. C., and L
resources of Buried Co
Kansas: Kansas Geologic

Hodson, W. G., 1963, Geology
County, Kansas: Kansas

_____1965, Geology and ground
sas: Kansas Geological S

_____1969, Geology and ground
Kansas: Kansas Geologic

Hodson, W. G., and Wahl, K. D.
sources of Gove County,
Bulletin 145, 126 p.

Johnson, C. R., 1958, Geology
County, Kansas: Kansas G

Lane, C. W., 1960, Geology an
County, Kansas: Kansas G

Latta, B. F., 1941, Geology a
County, Kansas: Kansas G

_____1944, Geology and ground-
Counties, Kansas: Kansas

_____1948, Geology and ground-
sas: Kansas Geological S

_____1950, Geology and ground-
Counties, Kansas: Kansas

Layton, D. W., and Berry, D. W.
sources of Pratt County,
ical Survey Bulletin 205,

McLaughlin, T. G., 1942, Geolog
ton County, Kansas: Kan
126 p.

_____1943, Geology and ground-
Counties, Kansas: Kansas

_____1946, Geology and ground-
and Stevens Counties, Kans
tin 61, 221 p.

_____1949, Geology and ground-
Counties, Kansas: Kansas

Pabst, M. E., and Stullken, L.
of the water table in the
U.S. Geological Survey W
File Report 81-1004, scale

Prescott, G. C., Jr., 1951, Ge
Lane County, Kansas: Kan
126 p.

_____1953, Geology and ground-
Kansas: Kansas Geological

_____1953, Geology and ground-
Kansas: Kansas Geological

_____1955, Geology and ground-
Kansas: Kansas Geological

Prescott, G. C., Jr., Branch, J
logy and ground-water res
ties, Kansas: Kansas Geo

Stullken, L. E., and Pabst, M.
of the water table in the
U.S. Geological Survey W
File Report 81-144, scale

Waite, H. A., 1942, Geology and
ty, Kansas: Kansas Geol

_____1947, Geology and ground-w
Kansas Geological Survey B

Walters, K. L., 1956, Geology a
County, Kansas: Kansas Ge

Watts, K. R., and Stullken, L.
of the base of the High P
logical Survey Water-Resou
81-344, scale 1:500,000, 1

Weeks, J. B., 1978, Plan of stu
fer-System Analysis in pa
New Mexico, Oklahoma, Sou
Geological Survey Water-Re

Williams, C. C., and Lohman, S.
resources of a part of so
ference to the Wichita mun
ical Survey Bulletin 79, 4

EXPLANATION

■ AREA OF BEDROCK OUTCROP WIT

▨ AREA WHERE WATER TABLE IS AT
Contours not shown

—1500— — WATER-TABLE CONTOUR— Shows
Solid where accurately located (type
is speculative (type 2). Contour i
Vertical Datum of 1929

——— BOUNDARY OF HIGH PLAINS AQU

ALTITUDE AND CONFIGURATION OF THE WATER TABLE IN THE HIGH PLAINS AQUIFER OF KANSAS, PRE-1950

By

L. E. Stullken and M. E. Pabst

1982

[illegible] that extends [illegible] Colorado, Nebraska, New Mexico, Oklahoma, South Dakota, Texas, and Wyoming. The aquifer in Kansas underlies 31,000 square miles in the western and south-central part of the State. The aquifer is a hydraulically connected assemblage of unconsolidated water-bearing deposits. In western Kansas, the High Plains aquifer consists principally of the Ogallala Formation of late Tertiary age overlain by deposits of Quaternary age. In south-central Kansas, the aquifer consists of unconsolidated deposits principally of Quaternary age. Valley alluvium of Quaternary age also is included in the deposits in both areas. The High Plains aquifer is delimited on the east by outcrops of Permian or Cretaceous rocks and by unsaturated deposits of Quaternary age.

The U.S. Geological Survey began a 5-year study of the High Plains regional aquifer during 1978 to provide: (1) Hydrologic information for evaluating the effects of continued ground-water development and (2) computer models for predicting aquifer response to changes in ground-water development. The plan of study for the High Plains Regional Aquifer-System Analysis is described by Weeks (1978). This report is one of a series that presents hydrologic information on the aquifer in Kansas for a specific time.

The altitude and configuration of the water table prior to 1950 are shown. The purpose of this map is to depict a "predevelopment" surface that can be compared with maps for later time periods to determine water-level changes. Data used in preparing the map include: (1) Water levels measured by the U.S. Geological Survey, as part of a continuing cooperative program with the Kansas Geological Survey and the Kansas State Board of Agriculture, Division of Water Resources; (2) water-level measurements in county reports by the Kansas Geological Survey (see "Selected References"); and (3) water levels from drilling contractors. In some localities where historic data were sparse, more recent measurements were considered for surface trends.

The pre-1950 water table sloped generally from west to east at an average rate of 10 feet per mile. The altitude of the water table ranged from about 3,900 feet in the southwest corner of Sherman County, northwestern Kansas, to about 1,350 feet in northern Sedgwick County, south-central Kansas. Ground water moved perpendicular to the water-table contours from higher altitudes in the western part of the High Plains to lower altitudes in the east. Contours that cross stream valleys without flexure may indicate that the water table was below the streambed. Upgradient flexures of water-table contours along stream valleys indicate that ground water flowed toward, and discharged into, streams. This was most evident along the South Fork Republican River in Cheyenne County, northwestern Kansas, and the South Fork Ninnescah River in Pratt and Kingman Counties, south-central Kansas.

of density of data available for this compilation, as shown on the map. Contours identified as type 1 are considered to be controlled by data and accurately represent water levels within ± 25 feet altitude (one-half contour interval). Type-1 contours generally coincide with areas of known ground-water irrigation potential. Contours identified as type 2 were inferred from various indirect sources, and the accuracy is considered to be speculative. Type-2 contours generally are in predominantly "fringe areas" of the aquifer system that have relatively little saturated thickness. Altitude and configuration of the land surface and bedrock, interpretations from previous reports, and water-level measurements dated other than that of the map were used to control type-2 contours. In areas where the water table was at or near the bedrock surface, contouring was not feasible.

CONVERSION TABLE

The inch-pound units of measurement given in this report are listed with equivalent International System of Units (SI), using the following conversion factors:

Inch-pound unit	Multiply by	SI unit
foot	0.3048	meter
mile	1.609	kilometer
square mile	2.590	square kilometer
foot per mile	0.1894	meter per kilometer

The National Geodetic Vertical Datum of 1929 (NGVD) is a geodetic datum derived from a general adjustment of the first-order level nets of both the United States and Canada. NGVD of 1929 refers to sea level in this report.

SELECTED REFERENCES

Bayne, C. K., 1956, Geology and ground-water resources of Sheridan County, Kansas: Kansas Geological Survey Bulletin 116, 94 p.

_____1956, Geology and ground-water resources of Reno County, Kansas: Kansas Geological Survey Bulletin 120, 130 p.

_____1960, Geology and ground-water resources of Harper County, Kansas: Kansas Geological Survey Bulletin 143, 184 p.

Byrne, F. E., and McLaughlin, T. G., 1948, Geology and ground-water resources of Seward County, Kansas: Kansas Geological Survey Bulletin 69, 140 p.

Fent, O. S., 1950, Geology and ground-water resources of Rice County, Kansas: Kansas Geological Survey Bulletin 85, 142 p.

Frye, J. C., 1942, Geology and ground-water resources of Meade County, Kansas: Kansas Geological Survey Bulletin 45, 152 p.

Frye, J. C., and Leonard, A. R., [illegible] Geology and ground-water resources of Norton County and northwestern Phillips County, Kansas: Kansas Geological Survey Bulletin 81, 144 p.

Hodson, W. G., 1963, Geology and ground-water resources of Wallace County, Kansas: Kansas Geological Survey Bulletin 161, 108 p.

_____1965, Geology and ground-water resources of Trego County, Kansas: Kansas Geological Survey Bulletin 174, 80 p.

_____1969, Geology and ground-water resources of Decatur County, Kansas: Kansas Geological Survey Bulletin 196, 41 p.

Hodson, W. G., and Wahl, K. D., 1960, Geology and ground-water resources of Gove County, Kansas: Kansas Geological Survey Bulletin 145, 126 p.

Johnson, C. R., 1958, Geology and ground-water resources of Logan County, Kansas: Kansas Geological Survey Bulletin 129, 175 p.

Lane, C. W., 1960, Geology and ground-water resources of Kingman County, Kansas: Kansas Geological Survey Bulletin 144, 174 p.

Latta, B. F., 1941, Geology and ground-water resources of Stanton County, Kansas: Kansas Geological Survey Bulletin 37, 119 p.

_____1944, Geology and ground-water resources of Finney and Gray Counties, Kansas: Kansas Geological Survey Bulletin 55, 272 p.

_____1948, Geology and ground-water resources of Kiowa County, Kansas: Kansas Geological Survey Bulletin 65, 151 p.

_____1950, Geology and ground-water resources of Barton and Stafford Counties, Kansas: Kansas Geological Survey Bulletin 88, 228 p.

Layton, D. W., and Berry, D. W., 1973, Geology and ground-water resources of Pratt County, south-central Kansas: Kansas Geological Survey Bulletin 205, 33 p.

McLaughlin, T. G., 1942, Geology and ground-water resources of Morton County, Kansas: Kansas Geological Survey Bulletin 40, 126 p.

_____1943, Geology and ground-water resources of Hamilton and Kearny Counties, Kansas: Kansas Geological Survey Bulletin 49, 220 p.

_____1946, Geology and ground-water resources of Grant, Haskell, and Stevens Counties, Kansas: Kansas Geological Survey Bulletin 61, 221 p.

_____1949, Geology and ground-water resources of Pawnee and Edwards Counties, Kansas: Kansas Geological Survey Bulletin 80, 189 p.

Pabst, M. E., and Stullken, L. E., 1981, Altitude and configuration of the water table in the High Plains aquifer in Kansas, 1980: U.S. Geological Survey Water-Resources Investigations Open-File Report 81-1004, scale 1:500,000, 1 sheet.

Prescott, G. C., Jr., 1951, Geology and ground-water resources of Lane County, Kansas: Kansas Geological Survey Bulletin 93, 126 p.

_____1953, Geology and ground-water resources of Cheyenne County, Kansas: Kansas Geological Survey Bulletin 100, 106 p.

_____1953, Geology and ground-water resources of Sherman County, Kansas: Kansas Geological Survey Bulletin 105, 130 p.

_____1955, Geology and ground-water resources of Graham County, Kansas: Kansas Geological Survey Bulletin 110, 98 p.

Prescott, G. C., Jr., Branch, J. R., and Wilson, W. W., 1954, Geology and ground-water resources of Wichita and Greeley Counties, Kansas: Kansas Geological Survey Bulletin 108, 134 p.

Stullken, L. E., and Pabst, M. E., 1981, Altitude and configuration of the water table in the High Plains aquifer in Kansas, 1975: U.S. Geological Survey Water-Resources Investigations Open-File Report 81-144, scale 1:500,000, 1 sheet.

Waite, H. A., 1942, Geology and ground-water resources of Ford County, Kansas: Kansas Geological Survey Bulletin 43, 250 p.

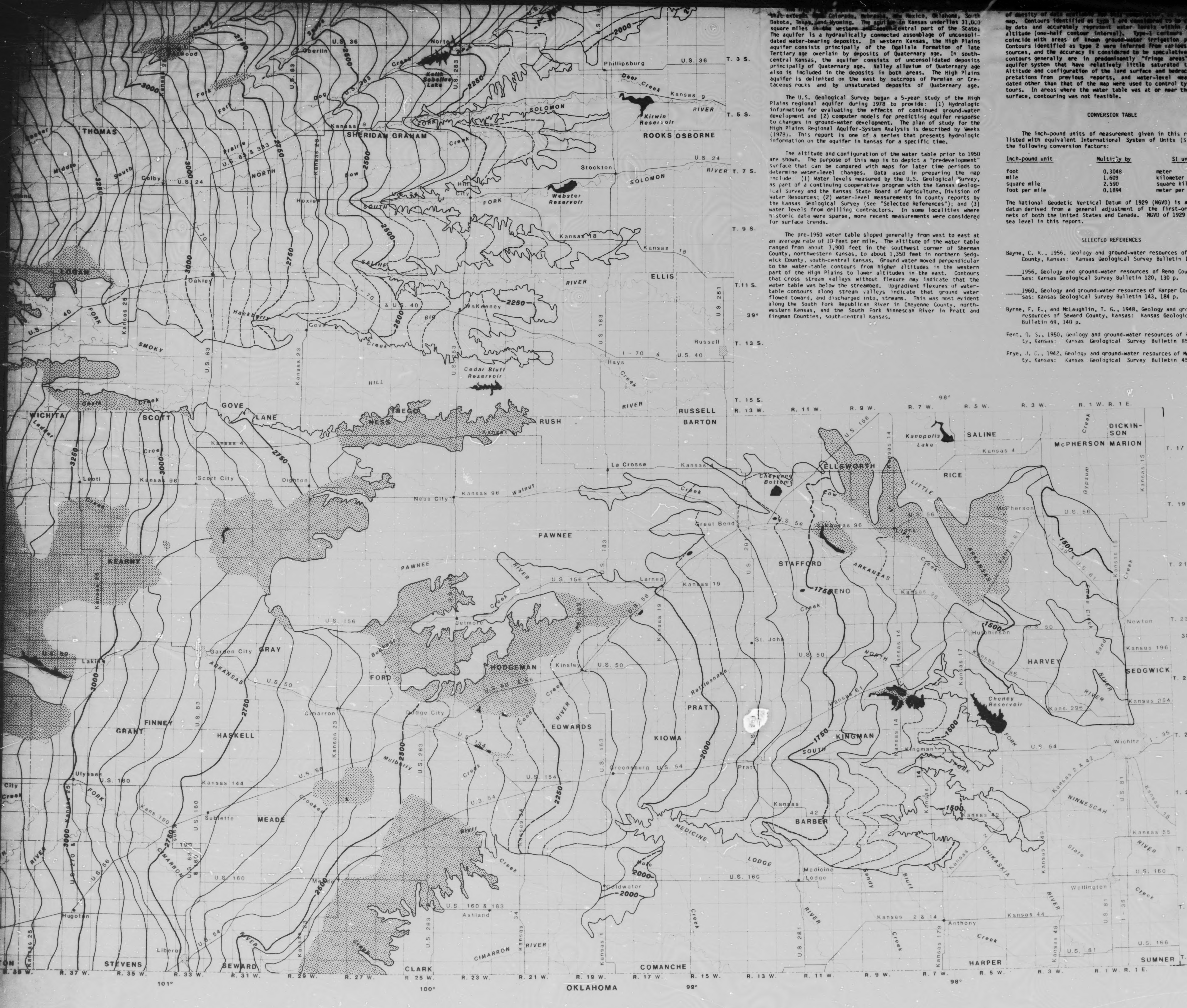
_____1947, Geology and ground-water resources of Scott City, Kansas: Kansas Geological Survey Bulletin 66, 216 p.

Walters, K. L., 1956, Geology and ground-water resources of Rawlins County, Kansas: Kansas Geological Survey Bulletin 117, 100 p.

Watts, K. R., and Stullken, L. E., 1981, Generalized configuration of the base of the High Plains aquifer in Kansas: U.S. Geological Survey Water-Resources Investigations Open-File Report 81-344, scale 1:500,000, 1 sheet.

Weeks, J. B., 1978, Plan of study for the High Plains Regional Aquifer-System Analysis in parts of Colorado, Kansas, Nebraska, New Mexico, Oklahoma, South Dakota, Texas, and Wyoming: U.S. Geological Survey Water-Resources Investigations 78-70, 28 p.

Williams, C. C., and Lohman, S. W., 1949, Geology and ground-water resources of a part of south-central Kansas, with special reference to the Wichita municipal water supply: Kansas Geological Survey Bulletin 79, 455 p.



EXPLANATION

■ AREA OF BEDROCK OUTCROP WITHIN AQUIFER BOUNDARY

▨ AREA WHERE WATER TABLE IS AT OR NEAR BEDROCK SURFACE-- Contours not shown

—1500—– WATER-TABLE CONTOUR-- Shows altitude of water table, pre 1950. Solid where accurately located (type 1): and short dash where location is speculative (type 2). Contour interval 50 feet. National Geodetic Vertical Datum of 1929

——— BOUNDARY OF HIGH PLAINS AQUIFER

1 : 500 000

0 10 20 MILES

0 10 20 KILOMETERS

ALTITUDE AND CONFIGURATION OF THE WATER TABLE IN THE HIGH PLAINS AQUIFER OF KANSAS, PRE-1950

By

L. E. Stullken and M. E. Pabst

1982